HEWLETT hp PACKARD

OPERATING AND SERVICE MANUAL

12875A

PROCESSOR INTERCONNECT KIT

Card Assembly
12566-6001, Rev. 926

Note

This manual should be retained with Volume Three of the Hewlett-Packard computer documentation. The Microcircuit Interface Kit Operating and Service Manual, part no. 12566-9001, should be attached to and considered part of this manual.

12875-90002

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SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. This manual provides general information, installation, programming, theory of operation, maintenance, and replaceable parts information for the Hewlett-Packard 12875A Processor Interconnect Kit. (See figure 1-1.) For detailed information about the microcircuit interface cards contained in the kit, refer to the attached HP 12566A Microcircuit Interface Kit Operating and Service Manual, part no. 12566-9001.

1-3. GENERAL DESCRIPTION.

1-4. The processor interconnect kit is primarily intended for use with the Hewlett-Packard time-shared BASIC systems. However, the kit may be used in other applications that require two HP computers to be interconnected. In the time-shared systems, the kit interconnects two Hewlett-Packard computers to provide the capability to connect and process data from up to thirty-two teleprinter terminals in the system. One computer controls teleprinter input/output operations; the other processes the data.

1-5. EQUIPMENT SUPPLIED.

1-6. The processor interconnect kit contains the following items:

a. Four 12566-6001 Microcircuit Interface Cards.

b. Two 12875-60001 Interconnecting Cables.

c. One 1251-0332 Connector, 24 pin.

d One 12875-90002 Operating and Service Manual.

1-7. IDENTIFICATION.

1-8. Printed-circuit card revisions are identified by a letter, a date code, and a division code stamped on the card (e.g., A-1055-22). The letter code identifies the version of the etched trace pattern on the unloaded card. The date code (middle digits) refers to the electrical characteristics of the loaded card. The division code (last two digits) identifies the Hewlett-Packard division that manufactured the card. If the date code stamped on the printed-circuit card does not agree with the date code shown on the title page of this manual, there are differences between your card and the card described in this manual. These differences are described in manual supplements available at the nearest HP Sales and Service Office.

1-9. SPECIFICATIONS.

1-10. Specifications for the microcircuit interface cards, which are included in the processor interconnect kit, are listed in the attached Microcircuit Interface Kit Operating and Service Manual.

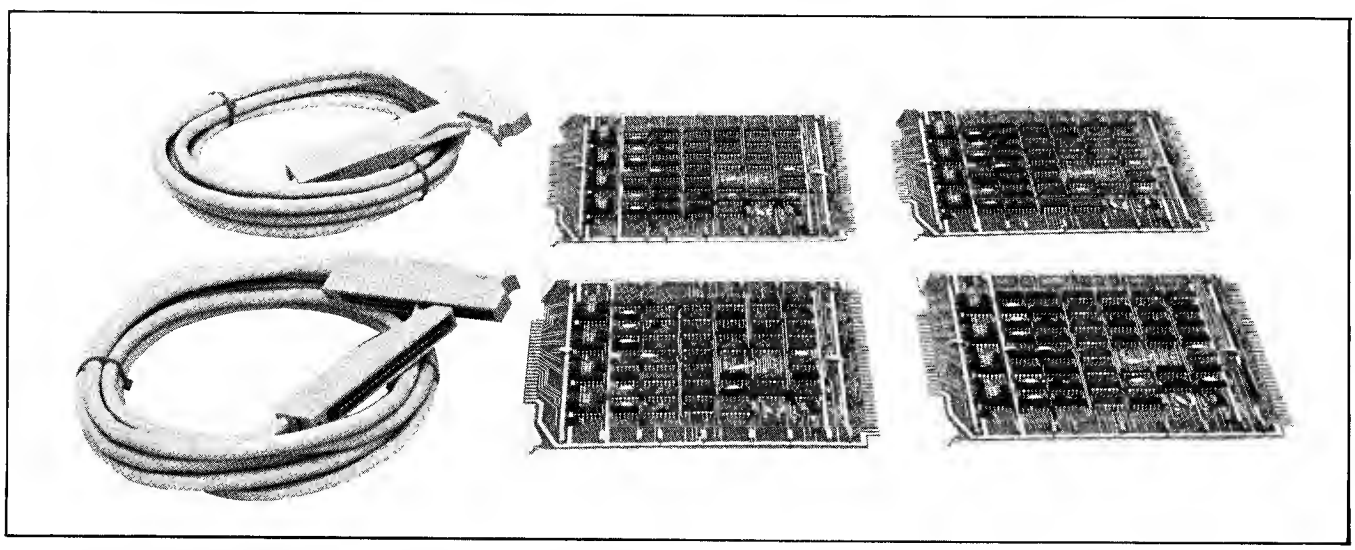

Figure 1-1. Hewlett-Packard 12875A Processor Interconnect Kit

SECTION II
INSTALLATION AND PROGRAMMING

2-1. INTRODUCTION.

2-2. This section contains installation and programming information for the processor interconnect kit.

2-3. UNPACKING AND INSPECTION.

2-4. If the shipping carton is damaged upon receipt, request that the carrier's agent be present when the kit is unpacked. Inspect the kit for damage (cracks, broken parts, etc.). If the kit is damaged and fails to operate properly, notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately. (Sales and Service Offices are listed at the back of this manual.) Retain the shipping container and the packing material for the carrier's inspection. The Hewlett-Packard Sales and Service Office will arrange for the repair or replacement of the damaged kit without waiting for any claims against the carrier to be settled.

2-5. INSTALLATION CHECKOUT.

2-6. Before installing the processor interconnect kit, perform the diagnostic program tests for the interface cards and the interconnecting cables. The diagnostic program for the interconnecting cables is described in the Diagnostic Program Procedure, part number 12875-90003, in the Manual of Diagnostics furnished with the computer documentation. The diagnostic program for the interface cards is described in the Diagnostic Program Procedure, part number 12554-90023, in the Manual of Diagnostics.

2-7. INSTALLATION.

2-8. The microcircuit interface cards obtain operating voltages from the computer power supply. Prior to installing the cards, determine if the cards will impose an excessive added current load on the computer power supply as explained in Volume Three of the computer documentation. Two cards are installed in each of the two computers; each pair of cards requires 0.10 amperes from the -2-volt supply and 2.20 amperes from the +4.5-volt supply. If these currents will overload the computer supply, an HP 2160A Power Supply Extender must be used.

2-9. Install the processor interconnect kit as follows:

a. Ensure that jumpers on all four circuit cards are connected as shown in table 2-1.

b. Disconnect power from computers in which cards are to be installed.

Table 2-1. Printed-Circuit Card Jumper Positions

JUMPER	POSITION	EFFECT
W1	A	Encode signal negative true.
W2	B	Encode reset on negative-going edge of Device Flag signal
W3	B	Set computer Flag Buffer FF on negative-going edge of Device Flag signal.
W4	B	Ungated output data.
W5 thru W8	Connected	Data gated into storage when computer Flag FF is set by Device Flag signal.
W9	A	CLC instruction clears Encode FF.

c. Gain access to card cages of both computers. Insert two microcircuit interface cards in slots of each computer that correspond to desired select codes. Make certain that every higher priority slot has either another I/O card or a priority jumper card (part no. 02116-6110) installed.

d. Interconnect the two computers using the two cables included in kit as shown in figure 2-1. Connect higher priority card in each computer to lower priority card in other computer. Slots X and Y in figure 2-1 refer to higher and lower priority slots, respectively. Actual slot numbers may be different in each computer.

2-10. SHIPPING AND STORAGE.

2-11. If the kit is to be shipped to Hewlett-Packard for repair, include an explanation of the service or repair to be performed. Identify the owner of the kit and provide the complete kit model number.

2-12. When preparing the kit for shipping or storage, place the kit in the original container if available. If the original container is not available, a suitable container and shipping material can be purchased from the nearest Hewlett-Packard Sales and Service Office.

2-13. If standard HP shipping material is not used, wrap each cable and circuit card in heavy paper and place in a strong corrugated container. Place adequate packing material on all sides of the kit and bind the container with strong tape. Mark the shipping container "FRAGILE."

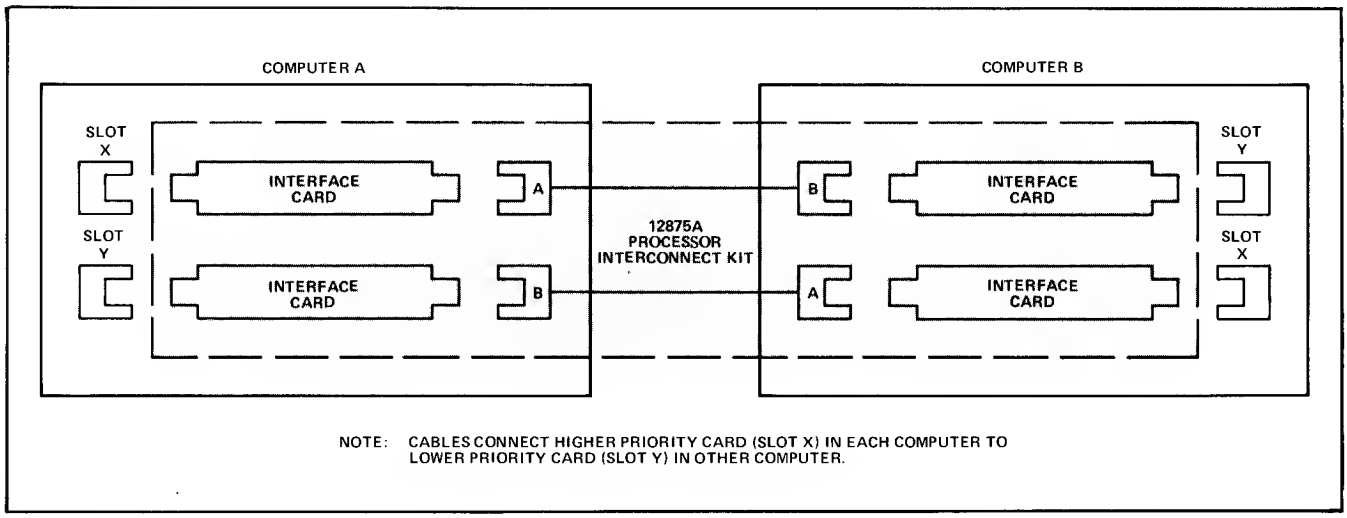

Figure 2-1. Processor Interconnect Kit Installation

2-14. PROGRAMMING.

2-15. The following paragraphs provide assembly language information necessary to program a data transfer between two HP computers that are interlinked with the processor interconnect kit. Additionally, table 2-2 provides separate input and output programs that will transfer a block of 100 words from one computer memory to the other. The programs use the skip-if-flag-is-set (non-interrupt) method of data transfer, and one program must be loaded into each computer.

2-16. All transfers of data and program instructions between the two computers must be made through the two channels provided by the processor interconnect kit. Each computer uses one channel as an input channel and the other channel as an output channel. In the following discussion, these channels are designated channel 1 and channel 2, respectively.

2-17. In the case of an input operation from a teleprinter, program instructions must cause computer A (see figure 2-1) to input data from the teleprinter terminal. Further instructions must cause the data to be output to the lower priority microcircuit interface card in computer A. (The processor interconnect kit includes two microcircuit interface cards for each computer.) When data is output from the lower priority card in computer A, the Encode signal from that card (a result of an STC,C program instruction) is applied as the Device Flag signal to the higher priority microcircuit interface card in computer B. The Device Flag signal causes the data to be stored in the input storage register of the higher priority card and, if the interrupt system is being used, causes an interrupt in the program being executed. Program instruction must now cause computer B to process the data.

2-18. More specifically, when program instructions cause a data output from channel 2 of computer A (OTA, then STC,C), the channel 2 Encode signal is applied to the Device Flag input of channel 1 in computer B. The Encode signal clocks data into the channel 1 input register and sets the channel 1 Flag FF. This signals computer B that data is available in the input register and causes an interrupt in the program if the interrupt system is being used. If the interrupt system is not being used, computer B must be programmed with an SFS instruction as used in the sample programs of table 2-2. An LIA/B program instruction is used to enter the data into the A- or B-register of the receiving computer. An STC,C program instruction (with the select code of channel 1) sends a Device Flag signal back to computer A, enabling another transfer by setting the channel 2 Flag FF.

2-19. Direct memory access (DMA) may be used for high-speed data block transfers. For specific programming information about DMA, refer to the appropriate Direct Memory Access Operating and Service Manual.

Table 2-2. Sample Input and Output Programs

The following programs will transfer a block of 100 computer words from one computer to another. The computers must be interlinked with the processor interconnect kit, and one program must be loaded into each computer.

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 PAGE 0002 #01


0001                ASMB,A,B,L,T
0002*   COMPUTER TO COMPUTER TRANSFER
0003*      ABSOLUTE INPUT PROGRAM
0004  00200                ORG 200B
0005  00200 103115  START CLF CHAN      CLEAR INPUT DEVICE FLAG (SEE
0006*                                      NOTES BELOW)
0007  00201 060217        LDA BUFA      STORE STARTING ADDRESS OF BUFFER
0008  00202 070365        STA ADD         WHERE DATA WILL BE STORED
0009  00203 060220        LDA BUFL      STORE BUFFER LENGTH
0010  00204 070366        STA WDCT        (NEGATIVE) FOR WORD COUNT
0011  00205 102315  RETRN SFS CHAN      WAIT UNTIL TRANSFER IS INITIATED
0012  00206 024205        JMP *-1         BY OTHER COMPUTER
0013  00207 102515        LIA CHAN      INPUT CHARACTER AND STORE
0014  00210 170365        STA ADD,I       IN PROGRAM BUFFER
0015  00211 103715        STC CHAN,C    INITIATE ANOTHER TRANSFER
0016  00212 106715        CLC CHAN      FOR NON-INTERRUPT TRANSFER - SO
0017*                                      SETTING OF FLAG WILL NOT CAUSE
0018*                                      INTERRUPT
0019  00213 034365        ISZ ADD       INCREMENT BUFFER ADDRESS
0020  00214 034366        ISZ WDCT      INCREMENT WORD COUNT
0021  00215 024205        JMP RETRN     TRANSFER NOT COMPLETE
0022  00216 102077        HLT 77B       HALT - TRANSFER COMPLETE
0023  00217 000221  BUFA  DEF BUF       DEFINE BUFFER ADDRESS
0024  00220 177634  BUFL  DEC -100      BUFFER LENGTH
0025  00221 000000  BUF   BSS 100       INPUT BUFFER - 100 WORDS
0026  00365 000000  ADD   BSS 1         BUFFER ADDRESS POINTER WORD
0027  00366 000000  WDCT  BSS 1         WORD COUNTER
0028  00015         CHAN  EQU 15B       I/O CHANNEL OF OUTPUT DEVICE
0029*
0030* NOTES: 1. CLF CHAN REQUIRED IF INPUT DEVICE FLAG NOT PREVIOUSLY
0031*           CLEARED (PRESET BEING PUSHED) WHEN INPUT PROGRAM
0032*           IS INITIATED FIRST
0033*        2. WITH CLF CHAN INPUT PROGRAM MUST BE INITIATED FIRST
0034*        3. IF OUTPUT PROGRAM IS INITIATED FIRST OMIT CLF CHAN
0035*
0036                     END
**  NO ERRORS*
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PAGE 0002 #01

0001                ASMB,A,B,L,T
0002*   COMPUTER TO COMPUTER TRANSFER
0003*      ABSOLUTE OUTPUT PROGRAM
0004  00100                ORG 100B
0005  00100 060116  START LDA BUFA      STORE STARTING ADDRESS OF BUFFER
0006  00101 070264        STA ADD         THAT CONTAINS DATA
0007  00102 060117        LDA BUFL      STORE BUFFER LENGTH
0008  00103 070265        STA WDCT        (NEGATIVE) FOR WORD COUNT
0009  00104 102314  RETRN SFS CHAN      WAIT UNTIL PREVIOUS TRANSFER
0010  00105 024104        JMP *-1         COMPLETE - INITIALLY FLAG IS
0011*                                      SET BY PRESET
0012  00106 160264        LDA ADD,I     OUTPUT WORD TO
0013  00107 102614        OTA CHAN        INTERFACE BUFFER
0014  00110 103714        STC CHAN,C    INITIATE ANOTHER TRANSFER
0015  00111 106714        CLC CHAN      FOR NON-INTERRUPT TRANSFER - SO
0016*                                      SETTING OF FLAG WILL NOT CAUSE
0017*                                      INTERRUPT
0018  00112 034264        ISZ ADD       INCREMENT BUFFER ADDRESS
0019  00113 034265        ISZ WDCT      INCREMENT WORD COUNT
0020  00114 024104        JMP RETRN     TRANSFER NOT COMPLETE
0021  00115 102077        HLT 77B       HALT - TRANSFER COMPLETE
0022  00116 000120  BUFA  DEF BUF       DEFINE BUFFER ADDRESS
0023  00117 177634  BUFL  DEC -100      BUFFER LENGTH
0024  00120 000000  BUF   BSS 100       OUTPUT BUFFER - 100 WORDS
0025  00264 000000  ADD   BSS 1         BUFFER ADDRESS POINTER WORD
0026  00265 000000  WDCT  BSS 1         WORD COUNTER
0027  00014         CHAN  EQU 14B       I/O CHANNEL OF INPUT DEVICE
0028*
0029*        SEE NOTES IN INPUT PROGRAM
0030*
0031                     END
**  NO ERRORS*
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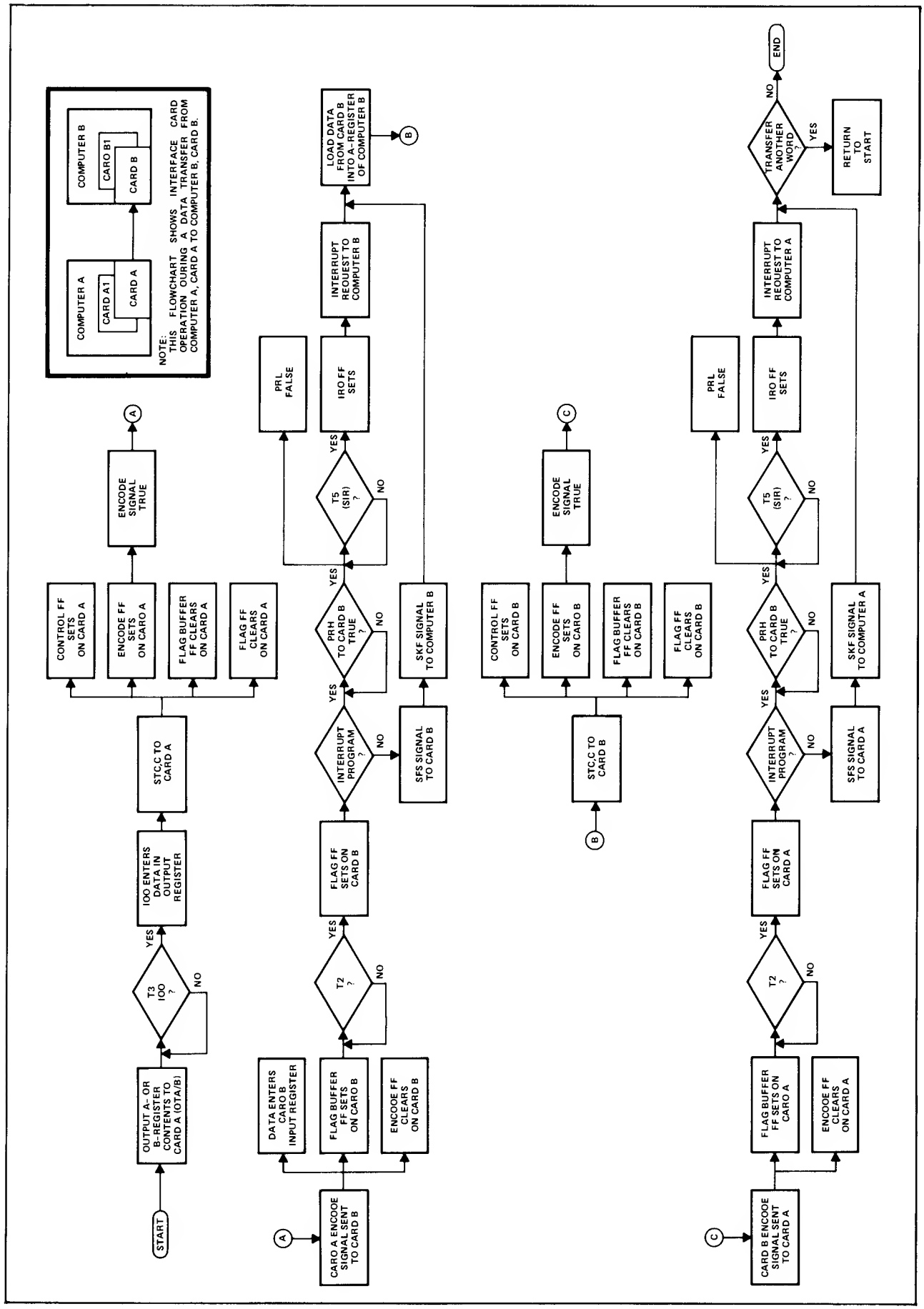

Figure 3-2. Operational Flowchart

SECTION IV
MAINTENANCE

4-1. INTRODUCTION.

4-2. This section provides preventive maintenance, troubleshooting, and diagnostic test information for the processor interconnect kit.

4-3. PREVENTIVE MAINTENANCE.

4-4. Volume II of the computer system documentation provides preventive maintenance information for the computer. There are no separate preventive maintenance procedures for the kit.

4-5. DIAGNOSTIC PROCEDURE.

4-6. The 12875-90003 and 12554-90023 Diagnostic Program Procedures in the Manual of Diagnostics provide operating information for the diagnostic programs. If error halts occur during the diagnostic program execution, refer to the troubleshooting information in the following paragraph.

4-7. TROUBLESHOOTING.

4-8. Figure 4-1 shows a diagram of the kit interconnecting cables. A schematic diagram, component location diagram, and diagrams of the integrated circuits contained on the kit interface cards are provided in the attached Microcircuit Interface Kit Operating and Service Manual. Troubleshoot the processor interconnect kit by using these diagrams and analyzing the error halts that occur during the running of the diagnostic program.

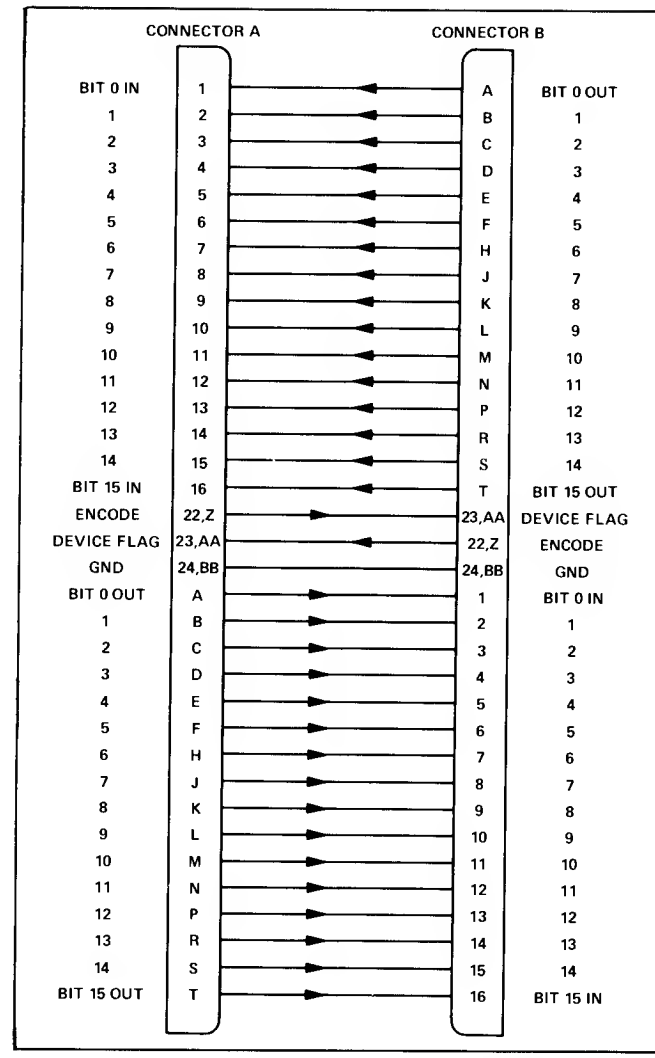

Figure 4-1. Interconnecting Cable Pin Assignments

SECTION V
REPLACEABLE PARTS

5-1. INTRODUCTION.

5-2. This section provides information for ordering replacement parts for the processor interconnect kit. Table 5-1 lists the replaceable parts in alphanumeric order of the HP part numbers and lists the following information for each part:

a. Description of the part. (Refer to table 5-2 for an explanation of abbreviations and reference designations used in the DESCRIPTION column.)

b. Typical manufacturer of the part in a five-digit code; refer to list of manufacturers in table 5-3.

c. Manufacturer's part number.

d. Total quantity of each part used in the kit.

5-3. ORDERING INFORMATION.

5-4. To order replacement parts, address the order or inquiry to the local Hewlett-Packard Sales and Service Office. (Refer to the list at the end of this manual for addresses.) Specify the following information for each part ordered:

a. Identification of the instrument, kit, or assembly containing the part.

b. Hewlett-Packard part number for each part.

c. Description of each part.

d. Circuit reference designation (if applicable).

Table 5-1. Replaceable Parts

HP PART NO.	DESCRIPTION	MFR CODE	MFR PART NO.	QTY
1251-0332	Connector, 24 pin	28480	1251-0332	1
12566-6001	Microcircuit Interface Card*	28480	12566-6001	4
12875-60001	Cable Assembly	28480	12875-60001	2
12875-90002	Operating and Service Manual	28480	12875-90002	1

*A replaceable parts list for the interface cards is contained in the attached Operating and Service Manual for the Microcircuit Interface Kit (part number 12566-9001).